

### **REMARKS**

Claims 1-40 were originally filed. Claims 32-40 were withdrawn as to non-elected invention. Claims 1-31 were the subject of the outstanding Office Action mailed January 10, 2003. By this amendment, Claims 1-18 have been cancelled. Claims 19-31 are currently pending. Claims 19, 20, 24, 30 and 31 have been amended. The support for the amended claim 19 is at least found at in the original claim 19 and at page 8, lines 10 through 15; and at page 11, lines 9 through 24. The support for the amended claim 20 is at least found at in the original claim 20 and at page 11, lines 6-8, page, and page 12, lines 1-25. The support for the amended claim 24 is at least found at in the original claim 24 and at and page 11, lines 9 through 14. The support for the amended claim 28 is at least found at in the original claim 28 and at page 11, lines 9 through 24. The support for the amended claims 30 and 31 are at least found at in the original claims 30 and 31 and at page 12, lines 14 through 17. It is believed that the amendments place the application in condition for allowance.

Independent claims 19 and 20 have been amended to clarify the protein X; and protein 1, protein 2 and protein 3 as being similar in homology to the SEQ IDS there described. Claim 24 was amended to correct a misspelling of *Citrobacter*. Claim 28 was amended to clarify protein X. Claims 30 and 31 were amended to correct their dependency on claim 20. Applicants submit that the objections and rejections have been resolved and the Examiner reconsider her objections and rejections.

### **Abstract**

The abstract was indicated as missing. The abstract is provided herewith to describe the invention as now claimed, describe dehydratase activity and describe the source of protein X, protein 1, protein 2 and protein 3. Applicants submit that the objections to the abstract have been resolved and the Examiner reconsider her objection.

### **Drawings**

Figures 9 and 10 were objected to because the description of coordinate y was asserted as missing. Substitute informal drawings are provided. Applicants have provided a description of the Y axis in red as required by MPEP 608.02 (p). Applicants respectfully submit that the objections to the drawings be reconsidered. Discussion of the Y axis is described in the Brief Description of the Drawings and in the Example 10,

page 51, line 25-29 as originally filed, so no new matter has been added. Applicants submit that the objections to the drawings have been resolved and the Examiner reconsider her objection.

### **Specification**

The Examiner objected to the specification because the symbol “®” in equations 1, 2, 3, and 4 on pages 1 and 2 have no meaning. The specification at page 25, Equations 1-3 also have the symbol as described by the Examiner. The specification has been amended to provide arrows for the symbol “®”.

The Specification was objected to (1) for the definition of protein x, (2) the description of protein x being asserted as indefinite and confusing because many proteins have the capacity of increasing the production of 1,3-propanediol and (3) because protein having only one amino acid changed may lose their functions and even high percentage of identity does not assure the same function. Applicants respectfully submit that the specification describes the invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed subject matter. In making this determination, the specification as a whole must be examined. Applicant respectfully submits that the specification, when viewed as a whole, is not indefinite and confusing.

The presence of protein X is useful in the *in vivo* reactivation of glycerol dehydratase which has been inactivated by the conversion of coenzyme B12 to hydroxycobalamin. Page 7, line 30 to 34; Page 20, line 31 to Page 21, line 20. In reviewing the specification as a whole, protein X is also described at many locations in addition to those described in the Office Action, for example at Page 10, line 34 through page 11, line 35; Page 17, line 30 to Page 18, line 8. Applicants submit that in viewing the specification as a whole, one skilled in the art would recognize that the inventor had possession of the claimed subject matter. Reference to the structural location provides further indication that the inventors had possession of the claimed subject matter as a further identification of an embodiment of the claimed subject matter. Applicants are not specifying that the DNA has to be located there, but that sequences homologous to those present at that location are useful in the practice of the claimed subject matter.

Furthermore, the description of protein X was objected to as indefinite because it was asserted that proteins having only one amino acid changed may lose their function and even a very high percentage of identity does not assure the same function.” In

viewing the specification as a whole, Applicants respectfully submit that they have asserted that those with at least 50% similarity to the specified SEQ IDS would function in the manner described. Applicants assert that even if melamine deaminase and antrazine chlorohydrolase having 98 percent homology function differently that does not mean that protein x proteins having homology with the identified SEQ ID's of protein X and/or protein 1, protein 2, and/or protein 3 would not function as described in Applicant's application. Applicant asserts that the Examiner has not met her burden in establishing indefiniteness with respect to Protein X in this case.

The specification was also amended to recite the current address of the American Type Culture Collection, thereby Applicants respectfully request reconsideration of this objection.

Applicant respectfully submits that the specification describes the invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed subject matter. Applicant respectfully requests that the assertion that the specification is indefinite and confusing be reconsidered.

### **35 USC § 112 Rejection**

Claims 1, 2, 19 and 20 were rejected under 35 USC 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter the inventors regard as the invention. The Examiner asserted that the claims "do not recite the function and structure of said proteins, thus do not set forth the metes and bounds for the patent protection desired. Claims 3 and 8-14 were included in this rejections as depending from rejected claim 1, 2 or 19-20 and do not correct the deficiency of the claims from which they depend." Applicants have cancelled claims 1-18, so the rejection with respect to claims 1,2, 3 and 8-14 are obviated. Applicants have amended claim 19 to recite the identification of protein x and have inserted SEQ ID NOS in claim 20, thereby obviating the rejection. Applicants have also amended Claim 28 to clarify protein X. Applicants have amended Claims 30 and 31 were amended to correct their dependency on claim 20.

**Statutory Double Patenting Rejection**

Claims 3, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 18 were rejected under 35 USC 101 as claiming the same invention as, respectively claims 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 of prior U. S. Patent 6,136,576. Claims 1-18 have been cancelled, thereby obviating the rejection.

**Non-Statutory Double Patenting Rejection**

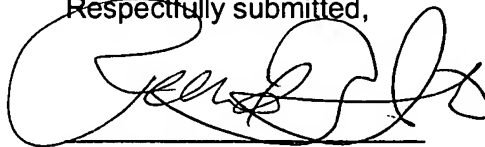
Claims 1, 4, 5, 6, and 7 were rejected under the judicially created doctrine of obvious-type double patenting as being unpatentable over claim 1 of USP 6,136,576. Claims 1-18 have been cancelled, thereby obviating the rejection.

**Allowable Claims**

Claims 19-31 were designated as allowable provided the Section 112 rejections per Claims 19, 20, 24 and 28 were amended to obviate such rejections. Applicants have also amended Claims 30 and 31 to expedite examination of this Application. Applicant has amended the claims as described above to obviate the Section 112 rejections.

It is believed that the claims, as currently amended, are in condition for allowance and reconsideration is respectfully requested. If in the opinion of the Examiner a telephone conference would expedite the prosecution of the subject application, the Examiner is encouraged to call the undersigned at (650) 846-4020.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Richard T. Ito', written over a horizontal line.

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Date: July 10, 2003

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STATUS OF THE CLAIMS

Claims 1- 18 (cancelled)

19. (Currently amended) A recombinant microorganism capable of producing 1,3-propanediol from a carbon source said recombinant microorganism comprising a) at least one gene encoding a dehydratase activity; b) at least one gene encoding a glycerol-3-phosphatase; and c) at least one gene encoding protein X having at least 50% similarity to protein X encoded by the nucleic acid sequence of residues 9749 – 11572 of SEQ ID NO:19 or protein X encoded by ORF Z of the dha regulon of the genus of *Citrobacter*, wherein production of 1,3-propanediol is greater in the microorganism than in the absence of said nucleic acid encoding protein X.

20. (Currently amended) The recombinant microorganism of Claim 19 further comprising d) at least one gene encoding a protein having at least 50% similarity to a protein selected from the group consisting of SEQ ID NO:60, SEQ ID NO:61 [protein 1], SEQ ID NO:62, SEQ ID NO:63 [of protein 2] SEQ ID NO:64 and SEQ ID NO:65 [ of protein 3].

21. (Original) The recombinant microorganism of Claim 19 selected from the group consisting of *Citrobacter*, *Enterobacter*, *Clostridium*, *Klebsiella*, *Aerobacter*, *Lactobacillus*, *Aspergillus*, *Saccharomyces*, *Schizosaccharomyces*, *Zygosaccharomyces*, *Pichia*, *Kluyveromyces*, *Candida*, *Hansenula*, *Debaryomyces*, *Mucor*, *Torulopsis*, *Methylobacter*, *Escherichia*, *Salmonella*, *Bacillus*, *Streptomyces* and *Pseudomonas*.

22. (Original) The recombinant microorganism of Claim 19 wherein the gene encoding protein X is isolated from a glycerol dehydratase gene cluster.

23. (Original) The recombinant microorganism of Claim 19 wherein the gene encoding protein X is isolated from a diol dehydratase gene cluster.

24. (Currently Amended) The recombinant microorganism of Claim 22 wherein the glycerol dehydratase gene cluster is from an organism selected from the genera consisting of *Klebsiella* and *Citrobacter* [*Citrobacter*].

25. (Original) The recombinant microorganism of Claim 23 wherein the diol dehydratase gene cluster is from an organism selected from the genera consisting of Klebsiella, Clostridium and Salmonella.

26. (Original) The recombinant microorganism of Claim 19 wherein said dehydratase activity is heterologous to said microorganism.

27. (Original) The recombinant microorganism of Claim 19 wherein said dehydratase activity is homologous to said microorganism.

28. (Currently amended) The recombinant microorganism of Claim 19 wherein the gene encoding protein X has the sequence as shown [in] between positions 0749 –11572 of SEQ ID NO:19 or ORF Z from Citrobacter dha regulon [ SEQ ID NO: 59].

29. (Original) The recombinant microorganism of Claim 20 wherein protein 1 has the sequence as shown in SEQ ID NO: 60 or SEQ ID NO: 61.

30. (Currently amended ) The recombinant microorganism [method] of Claim 20 wherein protein 2 has the sequence as shown in SEQ ID NO: 62 or SEQ ID NO: 63.

31. (Currently amended) The recombinant microorganism [method] of Claim 20 wherein protein 3 has the sequence as shown in SEQ ID: 64 or SEQ ID NO: 65.

32. (Withdrawn) A method for extending the halflife of dehydratase activity in a microorganism capable of producing 1,3-propanediol and containing at least one gene encoding a dehydratase activity, comprising the step of introducing a gene encoding protein X into said microorganism and culturing under conditions suitable for production of 1,3-propanediol.

33. (Withdrawn) The method of Claim 32 wherein the gene encoding the dehydratase activity is heterologous to said microorganism.

34. (Withdrawn) The method of Claim 32 wherein the gene encoding the dehydratase activity is homologous to said microorganism.

35. (Withdrawn) The microorganism of Claim 32 wherein the gene encoding protein X is isolated from a glycerol dehydratase gene cluster.
36. (Withdrawn) The microorganism of Claim 32 wherein the gene encoding protein X is isolated from a diol dehydratase gene cluster.
37. (Withdrawn) The microorganism of Claim 35 wherein the glycerol dehydratase gene cluster is from an organism selected from the genera consisting of *Klebsiella* and *Citrobacter*.
38. (Withdrawn) The microorganism of Claim 34 wherein the diol dehydratase gene cluster is from an organism selected from the genera consisting of *Klebsiella*, *Clostridium* and *Salmonella*.
39. (Withdrawn) The method of Claim 32 wherein the microorganism is selected from the group consisting of *Citrobacter*, *Enterobacter*, *Clostridium*, *Klebsiella*, *Aerobacter*, *Lactobacillus*, *Aspergillus*, *Saccharomyces*, *Schizosaccharomyces*, *Zygosaccharomyces*, *Pichia*, *Kluyveromyces*, *Candida*, *Hansenula*, *Debaryomyces*, *Mucor*, *Torulopsis*, *Methylobacter*, *Escherichia*, *Salmonella*, *Bacillus*, *Streptomyces* and *Pseudomonas*.
40. (Withdrawn) The method of Claim 32 further comprising the step of introducing a gene encoding at least one of protein 1, protein 2 and protein 3 into said microorganism.